CLAIMS

What is claimed is:

1. A method of manufacturing a capacitor of a semiconductor device, the method comprising:

forming a first electrode on a semiconductor substrate;

depositing a first dielectric layer on the first electrode;

curing the first dielectric layer in an atmosphere containing oxygen;

depositing a second dielectric layer on the cured first dielectric layer using only a source gas without a reactant gas; and

forming a second electrode on the second dielectric layer without curing the second dielectric layer.

2. The method as claimed in claim 1, wherein the first dielectric layer is deposited using only a source gas without a reactant gas.

3. The method as claimed in claim 1, wherein the first dielectric layer and the second dielectric layer are deposited using chemical vapor deposition.

4. The method as claimed in claim 1, wherein the first dielectric layer and the second dielectric layer are deposited using atomic layer deposition.

5. The method as claimed in claim 1, wherein the source gas includes oxygen atoms.

6. The method as claimed in claim 1, wherein the first dielectric layer and the second dielectric layer are deposited at a temperature of 100 to 600 °C.

7. The method as claimed in claim 1, wherein the first dielectric layer is deposited to a thickness of 5 to 200 Å, and the second dielectric layer is deposited to a thickness of 5 to 3000 Å.

8. The method as claimed in claim 1, wherein the source gas is one of $Ta(OC_2H_5)_5$, tetra ethoxide tantalum-dimethyl amine ethoxide, $Ta(OsBu)_5$, $Ta(OC_2H_5)_4(acacC_2H_5)$, $TaCl_2(OC_2H_5)_2C_5H_7O_2$, and $Ta(OCH_3)_5$.

9. The method as claimed in claim 1, wherein the first dielectric layer is formed of Ta_2O_5 using chemical vapor deposition.

10. The method as claimed in claim 1, wherein the second dielectric layer is formed of Ta_2O_5 using chemical vapor deposition.

11. The method as claimed in claim 1, wherein steps from depositing the first dielectric layer to depositing the second dielectric layer are performed in-situ in a single apparatus for forming dielectric layers.

12. The method as claimed in claim 1, wherein the atmosphere containing oxygen is an oxidative atmosphere containing O_2 or O_3.

13. The method as claimed in claim 1, wherein the atmosphere containing oxygen is electron cyclotron resonance or an RF plasma of one of O_2 and N_2O.

14. The method as claimed in claim 1, wherein the first electrode and the second electrode are formed of one of TiN, TaN, W, WN, Al, Cu, Ru, RuO_2, Pt, Ir, IrO_2, a doped polysilicon, and a combination thereof.

15. The method as claimed in claim 1, wherein the first dielectric layer and the second dielectric layer are formed of one of Ta_2O_5, HfO_2, ZrO_2, Al_2O_3, TiO_2, and a combination thereof.

16. A method of manufacturing a capacitor of a semiconductor device, the method comprising:

forming a first electrode on a semiconductor substrate;

depositing a first Ta_2O_5 layer on the first electrode;

curing the first Ta_2O_5 layer in an O_3 atmosphere;

depositing a second Ta_2O_5 layer on the cured first Ta_2O_5 layer using only $Ta(OC_2H_5)_5$ without a reactant gas; and

forming a second electrode on the second Ta_2O_5 layer without curing the second Ta_2O_5 layer.

17. The method as claimed in claim 16, wherein the first Ta_2O_5 layer is deposited using only $Ta(OC_2H_5)_5$ without a reactant gas.

18. The method as claimed in claim 16, wherein the first Ta_2O_5 layer and the second Ta_2O_5 layer are deposited using chemical vapor deposition.

19. An apparatus for forming a dielectric layer comprising:

a loadlock chamber including a cassette for receiving a plurality of semiconductor substrates;

a transfer chamber including a robot arm connected to the loadlock chamber for loading and unloading a semiconductor substrate to and from the loadlock chamber;

a first deposition chamber connected to the transfer chamber for depositing a first dielectric layer on the substrate;

a curing chamber connected to the first deposition chamber; and

a second deposition chamber connected to the transfer chamber for depositing a second dielectric layer on the substrate,

wherein a first dielectric layer deposited in the first deposition chamber is cured in the curing chamber and then a second dielectric layer is deposited in the second deposition chamber.

20. The apparatus as claimed in claim 19, wherein dielectric layers are deposited using only a source gas without a reactant gas in the first deposition chamber and the second deposition chamber.